Serial No.: 10/057,596
Examiner: Gollamudi Kishore, Ph.D.
Group Art Unit: 1615

CLAIM AMENDMENTS

1. (Currently Amended) An enzymatically active medical article comprising:

a medical article having a matrix disposed on said article, wherein the matrix comprises a block copolymer comprising a polyolefinic block comprising polybutylene and a thermoplastic block comprising polymers of acrylates, methacrylates or vinyl aromatics,

an enzyme disposed within said matrix and at or near a surface of said medical article, such that said medical article is provided with an enzymatically active surface, wherein said matrix allows diffusion of substrates into and diffusion of products out of the matrix,

wherein said enzyme is elected from the group consisting of protease enzymes, glycosidase enzymes, enzymes that degrade oxalate, and enzymes that generate NO from arginine.

2. (Withdrawn) The enzymatically active medical article of claim 1, wherein said enzyme is a protease enzyme.

3. (Withdrawn) The enzymatically active medical article of claim 1, wherein said enzyme is an enzyme that degrades cholesterol esters.

4. (Withdrawn) The enzymatically active medical article of claim 3, wherein said enzyme is selected from cholesterol esterase and cholesterol oxidase.

5. (Withdrawn) The enzymatically active medical article of claim 1, wherein said enzyme is an enzyme that converts hydrocortisone to cortisone.

6. (Withdrawn) The enzymatically active medical article of claim 5, wherein said enzyme is a hydrocortisone esterase enzyme.

7. (Withdrawn) The enzymatically active medical article of claim 5 claim 1, wherein said enzyme is a glycosidase enzyme.

8. (Withdrawn) The enzymatically active medical article of claim 7, wherein said enzyme is an α-galactosidase enzyme.

9. (Withdrawn) The enzymatically active medical article of claim 7, wherein said enzyme is a β-galactosidase enzyme.

10. (Withdrawn) The enzymatically active medical article of claim 1, wherein said enzyme is a β-glucosidase enzyme

11. (Original) The enzymatically active medical article of claim 1, wherein said enzyme is an enzyme that generates NO from arginine.

12. (Original) The enzymatically active medical article of claim 11, wherein said enzyme is nitric oxide synthetase.

13. (Original) The enzymatically active medical article of claim 11, wherein said enzyme is provided within a biocompatible, biostable matrix coating disposed on said medical article.

14. (Original) The enzymatically active medical article of claim 11, wherein said enzyme is attached to a surface of said medical article.

15. (Original) The enzymatically active medical article of claim 14, wherein said enzyme is covalently attached to a surface of said medical article.

16. (Original) The enzymatically active medical article of claim 14, wherein said enzyme is attached to a surface of said medical article by ion exchange forces.

17. (Original) The enzymatically active medical article of claim 14, wherein said enzyme is attached to a surface of said medical article by antibody-antigen interactions.

18. (Original) The enzymatically active medical article of claim 14, wherein said enzyme is attached to a surface of said medical article by nucleic-acid hybridization.

19. (Original) The enzymatically active medical article of claim 14, wherein said enzyme is attached to a surface coating on said medical device.

20. (Original) The enzymatically active medical article of claim 1, further comprising an enzyme-free coating layer provided over said enzyme, wherein said enzyme-free coating layer acts to hide said enzyme from immune surveillance.

21. (Original) The enzymatically active medical article of claim 1, wherein said medical article is a vascular medical device.

22. (Original) The enzymatically active medical article of claim 1, wherein said medical article is selected from a catheter, a guide wire, a balloon, a filter, a stent, a stent graft, a cerebral aneurysm filler, a vascular graft, a heart valve, a bandage and a bulking agent.

23. (Original) A therapeutic method comprising:

providing the enzymatically active medical article of claim 1; and

administering said medical article to a patient.

24. (Original) The therapeutic method of claim 23, wherein said medical article is a vascular medical device.

25. (Original) The therapeutic method of claim 23, wherein said enzyme is an enzyme that converts hydrocortisone to cortisone and wherein said medical article is administered to a site of inflammation.

26. (Withdrawn) The therapeutic method of claim 23, wherein said enzyme is an enzyme that converts hydrocortisone to cortisone and wherein said medical article is administered to a site of inflammation.

27. (Original) The therapeutic method of claim 23, wherein said enzyme is an enzyme that generates NO from arginine and wherein said medical article is administered to a site within the vasculature to prevent restenosis.

28. (Withdrawn) The therapeutic method of claim 23, wherein said enzyme is an enzyme that acts upon cholesterol esters and wherein said medical article is placed adjacent atherosclerotic plaque within the vasculature to degrade the cholesterol ester deposits found in said atherosclerotic plaque.

29. (Withdrawn) The therapeutic method of claim 23, wherein said enzyme is a glycosidase enzyme effective to degrade ceramide trihexoside in the treatment of Fabray's disease and wherein said medical article is a blood contacting device.

30. (Withdrawn) The therapeutic method of claim 23, wherein said enzyme is a glycosidase enzyme effective to degrade glycocerebroside in the treatment of Gaucher's disease and wherein said medical article is a blood contacting device.

31. (Withdrawn) The therapeutic method of claim 23, wherein said enzyme is a glycosidase enzyme effective to degrade ganglioside GM2 in the treatment of Tay-Sach's disease and wherein said medical article is implanted within the cranium.

32. (Withdrawn) The therapeutic method of claim 23, wherein said enzyme is oxalte oxidase and wherein said medical article is a urinary catheter.

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STATUS OF CLAIMS

Claims 1-32 are presently pending.

Claims 2-10, 26, and 28-32 are withdrawn as belonging to a non-elected species. Therefore, claims 1, 11-25 and 27 are currently under consideration.

Claim 1 is presently amended. Support for amended claim 1 is provided, inter alia, in the specification and claims as filed and specifically, in paragraphs [0029] to [0031], [0034], and [0036] to [0037].

REMARKS

Rejection of the claims under 35 U.S.C. § 102(b)

Claims 1, 13-14, 16 and 19-25 are presently rejected under 35 U.S.C. § 102(b) as anticipated by Hendrickson et al. (U.S. Patent No. 4,855,234); claims 1, 13-15 and 19-25 were rejected as anticipated by Antwerp (U.S. Patent No. 5,788,678); and claims 1, 11-14, 16, 19, and 21-25 were rejected as anticipated by Forster (Abstract, The American Journal of Surgery, 1988).

Applicant respectfully traverses these rejections and their supporting remarks. The present invention as claimed is not anticipated by any of these three references.

For example, independent claim 1, as amended, requires that the medical article comprise a block copolymer matrix comprising a polyolefinic block comprising polybutylene and a thermoplastic block comprising polymers of acrylates, methacrylates or vinyl aromatics. None of the references teaches or suggests utilizing these particular materials. Applicant has discovered that wherein the enzyme is disposed within a polymer matrix, it is important that the enzyme be held "in place, while at the same time allowing diffusion of substrates into and diffusion of products out of the matrix." (specification, paragraph [0030]). The claimed polymeric matrix materials have been particularly selected to achieve this purpose.

Henrickson et al., in contrast, contains no teaching or suggestion regarding enzymes disposed within a matrix comprising a polyolefin block and a thermoplastic block, much less matrix materials which allow diffusion of substrates into and diffusion of products out of the matrix.

Instead, Henrickson, teaches a hydrogen peroxide disinfection system for disinfecting contact lenses and other medical articles wherein the hydrogen peroxide is neutralized with

immobilized proteins on a woven or nonwoven fibrous support. (Hendrickson, col. 3, line 53 to col. 4, line 29). The enzymes are not contained within a matrix; neither does it teach a matrix which allows diffusion of substrates into and diffusion of products out of the matrix. Rather, the immobilized enzyme layer is coated with an outer layer of an erodible polymer. As the erodable polymer dissolves, the enzyme neutralizes the hydrogen peroxide present in a surrounding solution. (Hendrickson, col. 4, lines 3-16). Thus, Hendrickson fails to teach at least two features of the invention of claim 1.

Likewise, Van Antwerp teaches chemically bonding enzymes to the surface of a catheter and then placing a barrier-type layer over the enzymes. A starch-based "encapsulating coating" is applied to protect the enzyme from "rapid enzyme degradation and deactivation" (Van Antwerp, col. 3, lines 45-50 and col. 5, lines 17-26) and to "shield[] the enzyme from significant proteolytic body fluid breakdown." (Van Antwerp, col. 5, lines 4-8). There is no disclosure or suggestion of disposing enzymes within a polymeric matrix, much less the matrix materials specifically claimed.

Forster also fails to anticipate the present invention. Instead, Forster teaches immobilizing urokinase enzyme to the surface of a PTFE vascular prosthesis. As with the other references, there is simply no disclosure or suggestion, enabling or otherwise, of disposing enzymes within a polymeric matrix comprising a block copolymer comprising a polyolefinic block comprising polyisobutylene and a thermoplastic block comprising polymers of acrylates, methacrylates or vinyl aromatics.

Claims 11-25, and 27 depend either directly or indirectly from claim 1 and are therefore not anticipated over these references for at least the same reasons as claim 1 and also are further distinguished by additional claim limitations.

Rejection of the claims under 35 U.S.C. § 102(e)

Claims 1, 11-15, 19-25 and 27 were rejected under 35 U.S.C. § 102(e) as anticipated by Sivan (U.S. Patent No. 6,569,688).

In response, Applicant respectfully traverses the rejection.

Sivan discloses covalently attaching enzymes to the surfaces of a stent (Sivan, col. 3, lines 48-56). The Examiner, however, asserts that Sivan also discloses that nitric oxide enzyme

can be "alternatively trapped within a polymeric hydrogel that covers the stent" (Office Action, paragraph 4). However, Sivan fails to teach features of the present invention as claimed. Rather, the only disclosure in the entire reference regarding an enzyme disposed within a matrix relates to the following:

> Alternatively, the enzymes may be entrapped within a polymeric hydrogel network covering the stent by means of the following procedure: (i) treatment of the stent with 3-acryloxypropyl trimethoxysilane; and (ii) photopolymerization of a mixture of the enzyme and alpha, omega-diacryloyl polyethylene glycol.
> (col. 5, lines 3-9).

No enabling disclosure is provided for disposing enzymes within a polymeric matrix comprising a block copolymer comprising a polyolefinic block comprising polybutylene and a thermoplastic block comprising polymers of acrylates, methacrylates or vinyl aromatics, wherein the matrix allows diffusion of substrates into and diffusion of products out of the matrix. Further, there is nothing in the references to support an assertion that the claimed polymeric materials are somehow inherent in the reference, or that the selection of polymeric materials is merely a matter of design choice. Indeed, a conclusion of "design choice" in the absence of reasoning is never appropriate. *See, e.g., In re Lindberg*, 169 USPQ 728, 730 (Fed. Cir. 1971).

Thus, since all of the references fail to teach at least one feature of the claimed invention, and inherency of these features has not been shown, the rejection under 35 U.S.C. § 102 is improper and Applicant respectfully requests that it be withdrawn.

Rejection of the claims under 35 U.S.C. § 103(a)

Claims 17 and 18 were rejected as unpatentable over Hendrickson et al., Antwerp, Sivan or Forster, further in view of Applicant's statements of prior art.

Applicant respectfully traverses this rejection and submits that the present invention as described in independent claim 1 surpasses the inventive standards under 35 U.S.C. §103(a) in light of any combination of Hendrickson et al., Van Antwerp, Sivan or Forster further in view of Applicant's statements in paragraph [0029] of the application. Either singly or combined, these